

**PATENT CLAIMS**

1. An illumination unit for point illumination of a medium comprising at least one light emitter arranged to  
5 illuminate at least one illumination face via a microshutter arrangement, said microshutter arrangement comprising a plurality of microshutters, each microshutter comprising a light channel and an electrically activatable diaphragm device (4) associated with it,  
10 c h a r a c t e r i z e d in that at least one of the light emitters (1) is arranged to illuminate at least two microshutters via a first lens arrangement (2; 23), said lens arrangement comprising at least one microlens arranged with respect to each microshutter so that the  
15 light emitted by the light emitter or emitters is focused on or in the vicinity of the optical axis of the light channel (6; 26) of the individual microshutters.
2. An illumination unit according to claim 1, c h a r -  
20 a c t e r i z e d in that it additionally comprises a second microlens arrangement (27) arranged between the microshutters and the illumination face, so that light transmitted through the light channel (6; 26) of the individual microshutter is suitably focused on the illumi-  
25 nation face (9; 28).
3. An illumination unit according to claim 1, c h a r -  
a c t e r i z e d in that at least one of the light emitters is formed by an optical light guide (13; 29)  
30 which is optically connected to at least one light source.
4. An illumination unit according to claim 3, c h a r -  
a c t e r i z e d in that the optical light guide(s)  
35 is(are) formed by optical fibres.

5. An illumination unit according to claims 1-4,  
c h a r a c t e r i z e d in that at least one of the  
light sources (10) is formed by a short arc lamp.
- 5 6. An illumination unit according to claims 1-5,  
c h a r a c t e r i z e d in that the light source com-  
prises a short arc lamp (10) having light receiving opti-  
cal light guides or fibres (13) which are arranged within  
an angle of  $\pm 75^\circ$  with respect to the equator axis (E)  
10 of the lamp on a ball face (11, 12) around the lamp, and  
which are optically connected to and conduct light to the  
light emitters.
7. An illumination unit according to claims 1-6,  
15 c h a r a c t e r i z e d in that at least one of the  
light sources is formed by a laser source (21).
8. An illumination unit according to claims 1-7,  
c h a r a c t e r i z e d in that the activatable dia-  
20 phragm devices are formed by plates which are pivotally  
hinged to the microshutter arrangement.
9. An illumination unit according to claims 1-8,  
c h a r a c t e r i z e d in that it comprises a light  
25 emitter in the form of a light guide or optical fibre  
(29) optically connected to a light source and arranged  
to illuminate a plurality of microshutters arranged in a  
given face shape, at least one collimation lens (22)  
being arranged between the light emitter and the face  
30 shape so that collimated light is conducted toward the  
plurality first microlens arrangement (2; 23) associated  
with the microshutters.
10. An illumination unit according to claim 9, c h a r -  
35 a c t e r i z e d in that the face shape of the mi-  
croshutters forms a hexagon (32; 81; 87).

11. An illumination unit according to claim 9 or 10,  
c h a r a c t e r i z e d in that the illumination unit  
comprises at least eight hexagons (81; 87) which each are  
5 illuminated by an optical fibre optically connected to an  
illumination source.

12. An illumination unit according to claims 9-11,  
c h a r a c t e r i z e d in that the individual mi-  
10 croshutters with associated microlens optics are posi-  
tioned in rows in the transverse direction (T) of the  
face shape with the microshutters at a given mutual  
distance, said rows being mutually offset in the  
transverse direction.

15 13. An illumination unit according to claims 9-12,  
c h a r a c t e r i z e d in that the rows are arranged  
such that the projection of all the individual microshut-  
ters on the transverse direction (T) in the face shape  
20 results in a plurality of illumination points at a mutual  
distance  $\Delta L$  in the transverse direction (T).

14. An illumination unit according to claims 1-13,  
c h a r a c t e r i z e d in that the first and/or the  
25 second lens arrangement (23, 27) is formed by hexagonal  
focal lenses.

15. An illumination unit according to claims 1-14,  
c h a r a c t e r i z e d in that the face shape or  
30 shapes of the microshutters are arranged on one or more  
illumination heads (40), each illumination head (40) and  
the illumination face being adapted to perform a relative  
movement over an illumination area, said device being  
also provided with a control unit for controlling the  
35 microshutters in dependence on the relative movement

between the illumination head and the illumination face (41).

16. An illumination face according to claims 1-15,  
5 c h a r a c t e r i z e d in that the illumination head is formed by a rod (30), whose relative movement between the illumination face (41) is a single progressing movement in the transverse direction of the rod (30).

10 17. An illumination unit according to claims 1-16, c h a r a c t e r i z e d in that each individual microshutter is formed by an oscillating diaphragm element movable to and fro between two positions, said oscillating diaphragm element being suspended so that elastic  
15 forces act toward an equilibrium position between the two positions, said illumination unit additionally comprising a control unit for controlling the oscillating diaphragm element by means of electrostatic forces, said diaphragm element blocking the light channel of the microshutter in  
20 one of the two positions.

18. An illumination unit according to claims 1-17,  
c h a r a c t e r i z e d in that the illumination unit, between the microshutter arrangement and the illumination  
25 face additionally comprises optical means (98) for spreading the light beams emitted by the light channels over the illumination face.